Does Social Capital Affect Wages?

Yoshiho Matsunaga

1. Introduction

In recent years, many professions in Japan have been facing the problem of end of lifetime employment. Pay systems based on age are also being changed to reward professional ability. With so many researchers involved, it would be impossible to list specific examples of wage determinants. The most common and important factors given are gender, academic history, and work history. Among these, investment in education contributes to the development of professional capabilities among individuals, and can consequently lead to higher lifetime wages. This scenario, proposed by Becker (1964), was a big step in the development of human capital theory. Until then, wage differences were considered a systematic problem related to labor or resulting from imperfections in the labor market. However, following this approach, we were able to logically explain that dissimilar educational investments among people create different levels of work ability, which in turn lead to wage differences. Founded on this human capital theory, labor economics experienced a paradigm shift. Mincer (1974), in particular, came up with a practical model based on this theoretical framework. Using Mincer's (1974) practical wage model (Mincerian wage regression function), it became possible to calculate the rate of return on investment in education. This scenario-based earning function was rated highly as a practical model of human capital theory and, because of its wide applicability, has been employed in a broad range of economic disciplines, including development economics and educational economics. The Mincerian wage regression function is thus known as the cornerstone of earnings functions.

Previous studies have established that gender, academic history, work history, and other such social attributes do not constitute the exclusive determinant factors of earnings. In other words, they suggested that social attributes other than the above also have a role in determining earnings. In our paper, we focused on communication within the organization. Regardless of the amount of individual human capital accumulated within an organization and regardless of whether workers' individual productivity is high, organizational productivity will not improve without smooth dissemination of information (communication) within the organization. In addition, you cannot expect a high level of efficiency without trust and cooperation among the many production processes (Knack and Keefer 1997; La Porta et al. 1997; Zak and Knack 2001; Bowles and Gintis 2002; Sobel 2002). The importance of smooth communication lies in the proverbial fact that "two heads are better than one." For example, typically, two people will be able to come up with relatively better ideas based on the synergistic effects of their respective abilities. However, this can occur only where communication is effective. Without proper communication, there is a real possibility of a decline in organizational productivity irrespective of how productive each worker is.

Nakaba (1995) regards the ability to effectively communicate (communication ability) or cooperate with other workers as a type of human capital. On the other hand, Putnam (2000) does not consider communication ability to get things done effectively within a group as human capital. Rather, he considers communication ability — which he has researched deeply — on an independent basis. According to Putnam (2000), the ability to smoothly communicate your desires is a form of social capital and, following physical capital and human capital, can be considered as the third factor contributing to production. In his book, Putnam (2000) stated that social capital is made up of three factors: trust, norms of reciprocity, and networks. He also said, "Physical capital refers to physical objects, human capital to the characteristics of individuals, and social capital to the connections between people (social networks and the norms of reciprocity and trust that stem from them)." In addition, he suggested that if the accumulated pool of social capital is increased as an economic attribute, it leads to the promotion of cooperation between people within the organization, thus consequently improving productivity. With regard to the economic implications of social capital external to the organization, he paints a scenario in which communication proceeds smoothly between players in the market and, because this brings down the cost of business, cooperation between players can occur more readily. Furthermore, because communication flows more smoothly, the amount of information disseminated and the learning opportunities for individuals, firms, and organizations are greater, and different types of information can be combined in new ways. For example, formal and informal horizontal networks between venture businesses have promoted technological innovation in Silicon Valley, US.

If we consider physical capital and human capital as the engines of production

activities, social capital could be regarded as the lubricant required for the smooth operation of the engine. Similar to personal computers (physical capital) and education (human capital), social capital influences the productivity of a firm. For example, in comparison to workers with a high sense of distrust, those who tend to trust their colleagues help improve productivity. If social capital is essential for efficient production activities, then firms should highly evaluate workers with a large accumulation of social capital. Moreover, that evaluation should be fed back to the workers in the form of increased wages. If workers are rational, they would work to enrich their social capital and, thus, increase their earnings. In order to explore the relationship between social capital and wage, we begin by introducing a simple dynamic model of social capital in the economy.

2. A Dynamic Model of Social Capital and Wage

Consider an economy populated by identical representative agents who invest in social capital. While recent studies consider social capital as the characteristic of an economy, we treat it as an individual characteristic, following Glaeser et al. (2002). While our social capital model is similar to that of Glaeser et al. (2002), we set up a continuous time model unlike their discrete time model, following Matsunaga (2020).

Suppose a representative agent possesses private social capital at time t, $S(t)$, and derives utility from both private social capital and an average level of social capital in the economy, $\hat{S}$, over an infinite planning horizon. $R(\hat{S})$ denotes a differentiable function with $\hat{S}$ as its argument. The flow payoff, $R(\hat{S})S(t)^{\gamma}$, reflects both market returns and non-market returns. Here, $0 < \gamma < 1$ measures the impact of private social capital on the welfare, Z, of the representative agent. Market returns include higher wages, better promotion opportunity, and higher probability of finding a good job (Mouw 2003). Non-market returns include improvement in the economy, health, or happiness. This paper argues that there are positive complementarities on time investment in social capital across individuals. Therefore, we assume that $R'(\hat{S}) > 0$.

Let us assume that the time investment in social capital is denoted by:

$$C[I(t), S(t)] = I(t)\left[1 + \psi\left(\frac{I(t)}{S(t)}\right)\right] \tag{1}$$

where $\psi(0) = 0, \psi'(I/S) > 0$ and $\psi''(I/S) \geq 0$. Equation (1) implies the time investment with constant returns for both time investment and social capital and fundamental development of social capital takes time. For example, some people may take years to trust their neighbors or coworkers. Norms of reciprocity cannot be easily developed, either. This is particularly so if norms of reciprocity involve borrowing or lending money. Therefore, taking into account the time adjustment can be very important when social capital is accumulated

through promoting trust, networks, and norms of reciprocity.

Now, for simplicity, we present $\psi(I/S)$ in equation (1) in a more explicit form,

$$\psi\left(\frac{I(t)}{S(t)}\right)=\frac{b}{2}\frac{I(t)}{S(t)} \tag{2}$$

where b is a positive constant. The parameter b expresses the sensitivity of time adjustment and higher values of b implies more time adjustment.

Then, the representative agents' intertemporal utility function can be denoted by

$$Z=\int_0^{\infty}\left[R(\hat{S})S^{\gamma}-wI\left(1+\frac{b}{2}\frac{I}{S}\right)\right]e^{-\beta}dt \tag{3}$$

where β is a positive time discount rate. The opportunity cost of time is denoted by the wage rate, w if labor supply is inelastic.

On the other hand, the social capital stock follows a dynamic process expressed by

$$\dot{S}=I-\phi S \tag{4}$$

where $\phi>0$. Let θ be the probability that a representative agent socializes with others. Then $\phi=\theta\lambda+(1-\theta)$ is the depreciation rate of social capital arising from loosing connections with others due to, for example, mobility from his or her workplace, community, club, and so on. When $\theta=0$ (i.e. He or she has withdrawn from society.), his or her social capital depreciates at the maximum rate 1. When $\theta=1$ (i.e. He or she is a very social person.), his or her social capital depreciates at the rate $0<\lambda<1$.

Then, for the initial value of social capital, $S(0)=\bar{S}$, we may set up the current value Hamiltonian,

$$H(S,q,t)=R(\hat{S})S^{\gamma}-wI\left(1+\frac{b}{2}\frac{I}{S}\right)+q[I-\phi S] \tag{5}$$

where q is the shadow value of social capital. Then, the necessary conditions derived from "the maximum principle" should involve

$$q=\left[1+b\left(\frac{I}{S}\right)\right]w\,, \tag{6a}$$

$$\gamma R(\hat{S})S^{\gamma-1}+\frac{wb}{2}\left(\frac{I}{S}\right)^2-\phi q=-\dot{q}+q\beta\,. \tag{6b}$$

The optimal conditions for the centralized problem also involve the transversality condition,

$$\lim_{t\to\infty}q(t)S(t)e^{-\beta t}=0\,. \tag{6c}$$

Equations (6a) and (4) imply that

$$\dot{S} = \left(\frac{\frac{q}{w} - 1}{b}\right) S - \phi S \,. \tag{7}$$

Let S^* and q^* be the steady states of social capital and its shadow value, respectively. From equation (6b), the condition $\dot{q} = 0$ implies that

$$\gamma R\left(\hat{S}\right) S^{\gamma-1} + \frac{w}{2b}\left(\frac{q}{w} - 1\right)^2 - (\phi + \beta) q = 0 \,^{1)} \,. \tag{8a}$$

Moreover, from equation (7), the condition $\dot{S} = 0$ implies that

$$q = (1 + \phi b) w \,. \tag{8b}$$

Equation (8b) implies that for $b > 0$, the shadow value of social capital in the steady state is greater than the wage rate by $\phi b w$. Consequently, in steady state, S^* must satisfy the condition

$$(\phi + \beta)(1 + \phi b) w = \gamma R\left(\hat{S}\right) S^{*\gamma-1} + \frac{w}{2} b \phi^2 \,. \tag{8c}$$

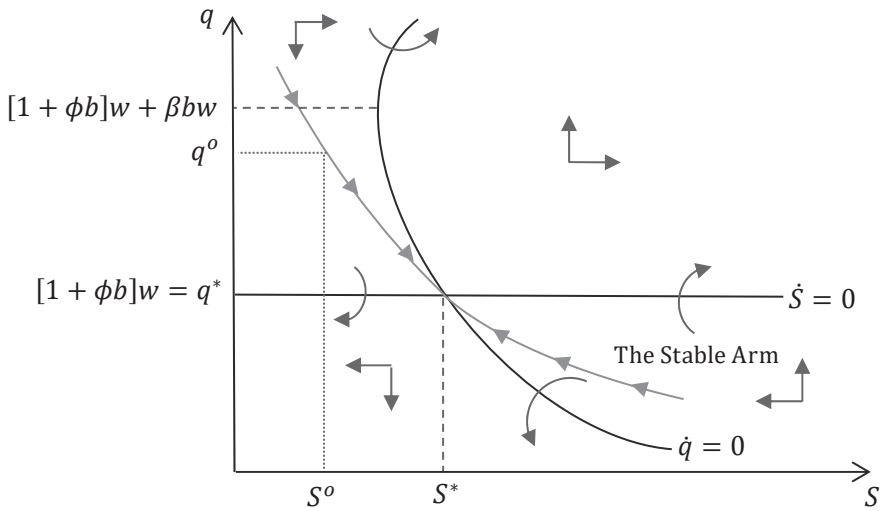

Figure 1　The Phase Diagram with Saddle-path Stability

1) Note that if we assume $R\left(\hat{S}\right) = \hat{S}^{(1-\gamma)}$, then there is no transitional dynamics because $\hat{S} = S$ holds in equilibrium. Consequently, q and S immediately jump to their steady-state levels.

Equation (8b) also implies that when social capital is entrenched in the economy and instantly available, or we have no time adjustment parameter $(b = 0)$, the steady-state value of q is equivalent to the wage rate (i.e. $q = w$). However, these cases are not appropriate according to the social capital theory.

We can draw the phase diagram with saddle-path stability as shown in Figure 1. Equation (6b) implies $\dot{q} > 0$ for $S > S^*$ and $\dot{q} < 0$ for $S < S^*$. On the other hand, equation (7) implies $\dot{S} > 0$ for $q > q^*$ and $\dot{S} < 0$ for $q < q^*$, as shown by the allows in Figure 1.
From equation (8a), the slope of the relation between q and S along with the locus $\dot{q} = 0$ is given by

$$\frac{dq}{ds} = \frac{\gamma(1-\gamma)RS^{\gamma-2}}{q - [1+\phi b]w - \beta bw} \quad . \tag{9}$$

Since the numerator is positive, $dq/ds > 0$ if $q > [1+\phi b]w + \beta bw$ and $dq/ds < 0$ if $q < [1+\phi b]w + \beta bw$.

The system described in Figure 1 exhibits saddle-path stability. The stable arm is downward sloping, as shown by the solid line with arrows.

A high value of social capital stimulates a great deal of time investment in social capital. Therefore, from equation (6a), I/S is high when q is high. An increase in social capital over time leads to a decrease in its price (q) and, in turn, to a reduction in I/S. Eventually, as q approaches q^*, I/S approaches ϕ as equations (6a) and (8b) show.

According to Putnam (2000), the current level of social capital in the US is low (ex. $S = S^0$). Thus, this model suggests that the price of social capital should be higher than before in the US. Many Japanese researchers claim that the current level of social capital in Japan is also low. The Cabinet Office, Government of Japan (2003) reports that the number of active members in a neighborhood has been decreasing in the last 20 years. The social problems reported daily in the Japanese media, such as the growing number of deaths of unattached elderly persons and increasing juvenile delinquency, are partly caused by declining social capital in the society. Consequently, this model shows that when social capital in the economy is low, a worker with a high social capital would be paid a higher salary than another worker with a lower social capital.

3. Social Capital and Personnel Rating in Japan

We have so far focused on the simple dynamic model of social capital. According to equation (8c), the next question that should be addressed is, "Does a wage system that can reflect accumulated social capital really exist?"

According to Sasajima (2004), a typical personnel evaluation in Japan that controls earnings is categorized into abilities evaluation, emotional evaluation, and results evaluation

(see Figure 2). Ability evaluation, which indicates one's ability to do his or her job, is based on criteria within the organization. As shown in Figure 2, ability evaluation is categorized into four sub-evaluation criteria: knowledge of duties, interpersonal skills, implementation skills, and leadership. Of these, interpersonal skills and leadership abilities that workers accumulate are related to social capital.

At any rate, human abilities are associated with many hidden qualities, making it difficult to evaluate them. According to Sasajima (2004), the number of firms conducting competency evaluations is apparently increasing. These firms look at how workers actually perform their work and, by observation, evaluate whether or not they have work abilities, or what is their actual level of ability. For example, if negotiations with a particular business contact are observed to proceed well, then the concerned employee will be evaluated as having the negotiation ability.

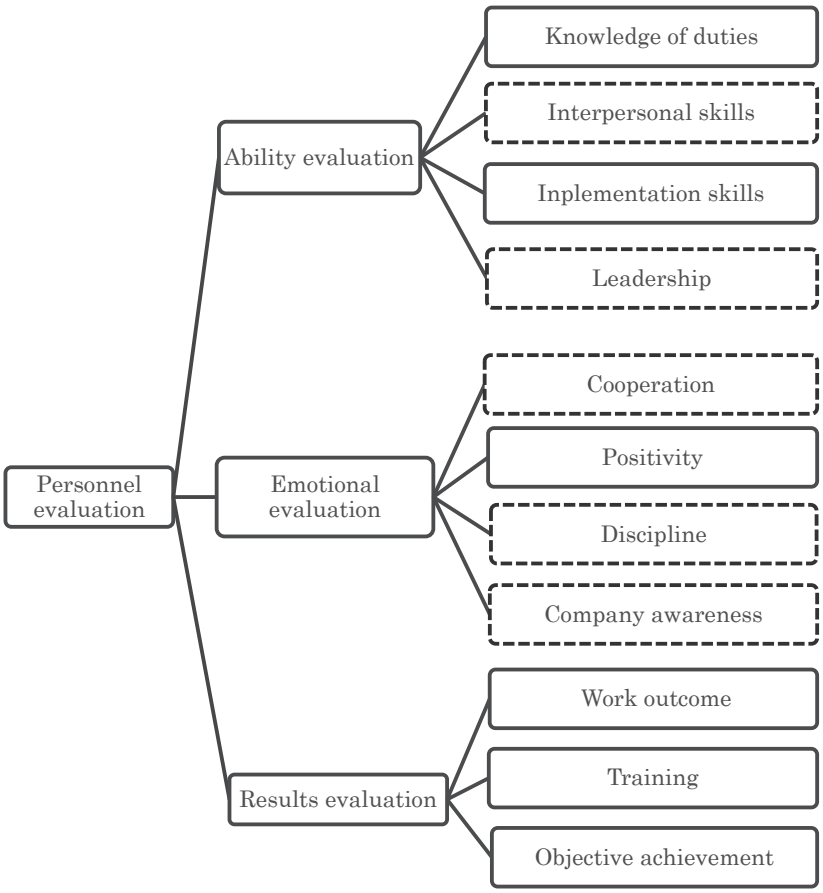

Figure 2 The Japanese Personal Evaluation Criteria

Source: Sasajima (2004)

Emotional evaluation is related to will and attitude. Specifically, this consists of four sub-criteria: cooperation (if they have a team), positivity, discipline (whether they are disciplined in the workplace), and company awareness (whether they act based on thinking about the bigger picture). We can say that all of these evaluations are related to the social capital accumulated by workers.

Evaluation of results is another personnel evaluation criterion, but it is divided into three sub-criteria: work output, training, and achievement of objectives. However, none of these evaluations are related to social capital. Result evaluation is measured on sales, targets, and customer satisfaction; therefore, reflecting the evaluation results in wages is relatively easy. Moreover, it is easy for workers to understand when results are evaluated and reflected in wages. However, interpersonal skills (negotiation skills), which can be regarded as social capital from abilities evaluation, can either be called human capital or social capital.

Basic salary mainly comprises age-based pay, work ability pay (effort pay), and duty pay. According to the Nomura Research Institute (2008), work ability pay is based on the ability to perform work duties. However, duty pay is based on the level of difficulty of the work you are responsible for doing. Work ability pay is the price attached to individual workers' abilities, and duty pay is the price attached to the post you are assigned to. Therefore, academic history and on-the-job training have an influence on work ability pay, but do not have any impact on duty pay. However, if you do not enjoy the trust of other workers, network with other workers, or possess communication abilities, you will not be assigned to an important position. Therefore, we can conclude that social capital does influence both work ability pay and duty pay.

From the above discussion, wages can be related to social capital and personnel evaluation as follows. Social capital of workers is evaluated on the basis of interpersonal skills, leadership (ability evaluation sub-criteria), cooperation, discipline, and company awareness (emotional evaluation sub-criteria). Therefore, these are reflected in the salary through duty pay and work ability pay. The evaluation axis surrounded by the dotted line in Figure 2 indicates the evaluation related to workers' accumulated social capital.

4. Measuring Social Capital

4.1. How Can We Quantify Trust?

With the progress of social capital studies, there is less dissent among researchers, but hardly any consensus on how to quantify social capital (Matsunaga 2015).

The question on how to quantify social capital holds the key to the research objective of this paper. Numerous researchers have defined social capital in different ways. Some focus only on one element of social capital — a social network (e.g., Belliveau et al. 1996;

Seibert et al. 2001; Florin et al. 2003; Fischer and Pollock 2004). Therefore, they measure social capital, for example, by the number of relations.

On the other hand, Dina (2008) measured social capital only by trust in order to empirically examine the relationship between social capital and human capital. Further, Dincer and Uslaner (2010) and Dearmon and Grier (2009) tried to measure social capital based on trust to show that trust has a positive effect on economic performance. However, Knack and Keefer (2000) tried to quantify trust, norms of reciprocity, and networks in order to examine if these three elements of social capital have positive effects on economic performance. Similarly, this paper tries to quantify Putnam's three factors of social capital.

As part of an attempt, in the U.S, to quantify trust as one of the three factors of social capital, respondents of the General Social Survey (GSS) were asked, "Generally speaking, do you feel you can trust most people? Or, do you think it is wise to exercise caution?" The Cabinet Office, Government of Japan (2003), which divides trust into "general trust" and "reciprocal trust/reciprocal support," constructed a question similar to the GSS poser mentioned above to quantify general trust.

In this paper, we used data from the Japanese General Social Survey (JGSS). The general information regarding the sampling of JGSS-2005 is as follows.

Sample area	Nationwide
Sample population	Men and women 20-81years of age living in Japan
Sample size	4,500
Sampling method	Two-stage stratified random sampling; stratified by regional block and polulation size No. of survey points: 307 No. of subjects at each survey point: 15
No. of respondents contacted	4,500
No. of valid responses	2,023
No. of nonresponses or invalid responses	2,477 (change of address: 190, address unknown: 79, death: 11, long term absence: 53, sickness: 96, in hospital: 56, other: 15)
Response rate	50.50%

The JGSS-2005 has the following interview questionnaire regarding general trust.

Q: Generally speaking, would you say that most people can be trusted?
A: 1. Yes 2. Depends 3. No

We can quantify trust based on the respondents' answers to questions similar to those in GSS. In other words, workers who trust other workers and workers who think they can use the abilities of other workers will be able to conduct business dealings smoothly within and outside the company. Because such workers will help reduce business expenses, they will be paid higher work ability pay and duty pay than those who trust their coworkers less.

4.2. How Can We Quantify Norms of Reciprocity?

With respect to the strength of norms (of civic cooperation), Knack and Keefer (1997) tried to quantify respondents' answers to a question whether each of the following behaviors "can always be justified, never be justified or something in between": (a) claiming government benefits which you are not entitled to, (b) avoiding a fare on public transport, (c) cheating on taxes if you have the chance, (d) keeping money that you have found, (e) failing to report damage you've done accidentally to a parked vehicle.

Putnam (2000) described norms (of reciprocity) as follows: "Surely at some point someone else will definitely do something for me. So I will do something for you without expecting anything in return." Therefore, Putnam's (2000) view was slightly different from that of Knack and Keefer (1997). In other words, the norm of reciprocity can be interpreted on the following lines: "He who gives to the poor lends to the lord." Put another way, this means, "If you show mercy to people, at some point that will come back to you, so what you do for other people is not for them, but for yourself."

Grootaert et al. (2004) used the following question to try to quantify norms of reciprocity: "Let us assume that your family suddenly needed a small amount of money for a period of one week. At this time, how many people outside of your family would lend you the money?" It seems that this question is most appropriate to measure norms of reciprocity designated by Putnam (2000). However, there was no such question in our dataset, JGSS-2005.

The Cabinet Office, Government of Japan (2003), on the other hand, tried to quantify the norm of reciprocity through involvement in societal activities such as participation in green belts, volunteer activities, NPO, local city activities, etc. In the JGSS-2005 interview survey questions, we find similar questions as in Cabinet Office, Government of Japan (2003). We regard the answers to the following question as a proxy variable to measure the norm of reciprocity.

Q: Have you made the following donations in the past year? Choose all that apply.
A:
1. I donated regularly.
2. I donated to collection boxes on street corners or in convenience stores, etc.
3. I donated in response to fund-raising by schools or local organizations.
4. I donated in response to appeals from media/mass communications (via bank transfer, Internet, telephone, etc.).
5. Others (Please specify)
6. I have not made any donations.

People throughout Japan sent large donations for the victims of the Great Hanshin-Awaji and Great East Japan earthquakes, and a large number of volunteers went to the affected areas offering help. However, they did not expect anything in return from the victims.

Nevertheless, people who hear about the large donations to the victims who flocked to the affected areas would probably expect that, in the event of a similar disaster, the same amount of donations would flow in. In other words, philanthropic acts such as making donations can be regarded as a type of the norms of reciprocity defined by Putnam (2000). Thus, if the choice is anything other than option 6, the respondent is considered to have the norm of reciprocity and will be coded $NORM = 1$. If, on the other hand, the respondent chooses option 6, the individual is regarded not to have the norm of reciprocity and will be coded $NORM = 0$.

4.3. How Can We Quantify Networks?

Generally, "relationships in the area" and "interaction with society" are used for quantification regarding network accumulation levels. The JGSS-2005 Survey Interview Sheet has a similar question.

Q: Are you a member of the following organizations?	
A. Political associations	0. No 1. Yes
B. Trade associations	0. No 1. Yes
C. Social service groups	0. No 1. Yes
D. Citizens' movement / Consumers' cooperative groups	0. No 1. Yes
E. Religious groups	0. No 1. Yes
F. Sports groups and clubs	0. No 1. Yes

If the respondents belong to several of the above groups, clubs, or organizations, then we assume that they have cultivated a large network. Through involvement with various people you meet in various networks, you can improve your sociability, negotiation power, and ability to read people. For example, when you meet a businessman you want to convince, you would be able to smoothly do so, and might be able to create new business opportunities through your networking activities. It is also possible that the number of business contacts could increase. Many organizations focus on building internal workers' networks within the company, plan multiple events as a way to share information, and proactively work on smooth flows of information within the company. For example, the Mori Building (website) conducted an awareness survey related to office life. In the survey, the investigators concluded that sporting events, staff vacations, drinking nights, activity circles, volunteer activities, and other types of communication outside of the workplace, in other words, informal communication, are particularly important for office workers in their 20s.

From the above discussion, if you belong to only one of the organizations mentioned above, you get a network accumulation rating of 1; if you belong to all of the organizations, your network accumulation rating is 6. Although the largest network accumulation value is theoretically 6, the highest value that the model uses is 5, according to the base statistical values shown in Table 2.

5. Estimation of Wage Function with Social Capital

In addition to the existing human capital viewpoint, we aim to estimate an earnings formula for a typical individual through the quantification of social capital, discussed in the second and third sections. The question on earnings in the JGSS-2005 Survey Interview Sheet is designed as follows.

Q: What was the annual income from your main job during the last one year? Please state the amount before taxes and other deductions.

1 (a) None
2 (b) Less than 700,000 yen
3 (c) 700,000 yen-1 million yen
4 (d) 1 million yen-1.3 million yen
5 (e) 1.3 million yen-1.5 million yen
6 (f) 1.5 million yen-2.5 million yen
7 (g) 2.5 million yen-3.5 million yen
8 (h) 3.5 million yen-4.5 million yen
9 (i) 4.5 million yen-5.5 million yen
10 (j) 5.5 million yen-6.5 million yen
11 (k) 6.5 million yen-7.5 million yen
12 (l) 7.5 million yen-8.5 million yen
13 (m) 8.5 million yen-10 million yen
14 (n) 10 million yen-12 million yen
15 (o) 12 million yen-14 million yen
16 (p) 14 million yen-16 million yen
17 (q) 16 million yen-18.5 million yen
18 (r) 18.5 million yen-23 million yen
19 (s) 23 million yen or over

Based on the simple dynamic social capital model and the JGSS-2005 question format for earnings and social capital, the Mincerian wage regression function incorporated with social capital could be expressed as follows.

$$wage_i^* = \alpha + \sum_{j=1}^{p} \beta_{ij} X_{ij} + \sum_{k=1}^{q} \gamma_{ik} SC_{ik} + \delta DEP_i + \varepsilon_i, \ i = 1,2,3 \cdots n \ , \qquad (10)$$

$$wage_i = j \ \text{if} \ A_{j-1} \leq wage_i^* < A_j, J = 1, \cdots, J, \ A_0 = -\infty, \ A_j = +\infty$$

where *A*s are logarithms and $wage^*$ is a latent variable of wage. Explanatory variables, *X*; *SC*; *DEP* are socio-demographic and human capital variables, social capital variables, and a depreciation variable of social capital arising from loosing communication with others due to his or her mobility from current job or business, respectively. A constant term is given by α and coefficients of explanatory variables are given by β ; γ ; δ . In particular, γ and δ are expected to be $\gamma > 0$ and $-1 \leq \delta < 0$, respectively in accordance with the dynamic model of social capital and wage shown in Chapter 2.

In addition, for the categorical data model estimation, we group answers 1 (None) and 2 (Less than 700,000 yen) into a single category. Therefore, the explained-variable categories in this study, numbering 18, are one lesser than those of the original JGSS-

2005. The explained variables are listed in Table 1. The statistics in Table 2 form the basis of the results of the categorical data model, shown in Table 3. The left-hand column of Table 3 shows the results estimated from a sample of men and women. The middle and right-hand columns show the results for men and women, respectively. The most salient points of the results are organized and explained as follows.

First, the income for men is about 78% higher than the income for women as shown in the left-hand column of Table 3. Such a large income difference between men and women is possibley because the sample population includes housewives who do not earn income. In addition, compared to those residing in large cities, the income is about 19% lower for those who reside in medium-sized cities and about 15% lower for those who reside in small cities. This can probably be explained by the fact that most large companies that pay higher salaries are located in large cities. Income is about 13% lower for those who work at medium-sized companies than those who work at large companies. Furthermore, those who belong to a labor union earn an about 10% higher income than those who do not. While most large companies have a formal labor union that includes most employees as members, medium-sized companies often do not have a formal labor union; even when they do, the union often lacks the ability to negotiate salaries with the management. Income is higher for workers who belong to a labor union when compared to those who do not, because belonging to a labor union implies working for a rather large company.

The analysis results indicate that as shown in previous studies, human capital is positively related to income. Salary increases by about 8% for every additional year of education. Also, salary increases by about 3% for each year of work experience, but this rate of increase diminishes over time. Likewise, salary increases by about 5% for each year of service, but this rate, too, diminishes over time.

As for the focal interest of this paper, the analysis results indicate that each of the three factors of social capital — networks, trust, and norms of reciprocity — is positively related to income. Specifically, as the network expands (i.e., when the worker joins one more organization on the list), income increases by about 8%. In addition, as the individual gets to trust others unconditionally, income increases by about 10%, and those who make donations earn an about 9.7% higher income than those who do not.[2)]

On the other hand, men with wives had about 13% higher yearly salary than those without wives as shown in the middle column of Table 3. We feel that the family support allowance could be a contributory factor for this difference. However, women with husbands earned roughly 15% less than those without husbands as shown in the right-hand

2) It is also conceivable that individuals with higher income are more likely to make a donation than individuals with lower income. However, Matsunaga (2010) has found that volunteers with lower income are actually more likely to make a donation than those with higher income. Therefore, we cannot necessarily conclude that individuals with lower income are more likely to make a donation than those with higher income.

Table 1　Dependent and independent variables

Dependent variable

What was the annual income from your main job during the last one year? Please state the amount before taxes and other deductions.

wage　*wage** =

(1) 0- less than 700,000 yen
(2) 700,000 yen - 1 million yen
(3) 1 million yen - 1.3 million yen
(4) 1.3 million yen - 1.5 million yen
(5) 1.5 million yen - 2.5 million yen
(6) 2.5 million yen - 3.5 million yen
(7) 3.5 million yen - 4.5 million yen
(8) 4.5 million yen - 5.5 million yen
(9) 5.5 million yen - 6.5 million yen
(10) 6.5 million yen - 7.5 million yen
(11) 7.5 million yen - 8.5 million yen
(12) 8.5 million yen - 10 million yen
(13) 10 million yen - 12 million yen
(14) 12 million yen - 14 million yen
(15) 14 million yen - 16 million yen
(16) 16 million yen - 18.5 million yen
(17) 18.5 million yen - 23 million yen
(18) 23 million yen or over

Independent Variables

Socio-demographic variables

SEXX = 1 if the respondent is male
SPOUSE = 1 if the respondent is married
COMPEDU = Number of child(ren) in compulsory school education
SCALE1 = 1 if the respondent lives in a middle-sized city
SCALE2 = 1 if the respondent lives in a small city
SMFIRM = 1 if the respondent works for firm with less than 300 labors
UNION = 1 if the respondent is a membe of labor union

ST5HLTH = The level of the respondent's health condition

poor ⟷ good

0	1	2	3	4

Human Capital

XXLSTS = Educational attainment
JOBEXP = Work experience= age- educational attainment -6
JOBEXP2 = Square of *JOBEXP*
XJOBYR = Length of service
XJOBYR2 = Square of *XJOBYR2*

Social Capital (*SC*)

[Trust]

TRUST = Generally speaking, would you say that most people can be trusted?

No	Depends	Yes
0	1	2

[Norms of reciprocity]

NORM = 1 if the choice is anything other than option 6; 0 otherwise

Have you made the following donations in the past year? Choose all that apply.
1. I donated regularly
2. I donated to collection boxes on street corners or in convenience stores, etc
3. I donated in response to fund-raising by schools or local organizations
4. I donated in response to appeals from media/mass communications (via bank transfer, Internet, telephone, etc.)
5. Others (Please specify)
6. I have not made any donations.

[Networks]

NET_1 = 1 if the respondent is a member of political associations; 0 otherwise
NET_2 = 1 if the respondent is a member of trade associations; 0 otherwise
NET_3 = 1 if the respondent is a member of volunteer groups; 0 otherwise
NET_4 = 1 if the respondent is a member of a citizens' movement or consumers' cooperative groups; 0 otherwise
NET_5 = 1 if the respondent is a member of religious groups; 0 otherwise
NET_6 = 1 if the respondent is a member of sports groups; 0 otherwise

NETWORK = ΣNET_i, $i=1,2,3,4,5,6$

Depreciation

DEP =

Are you considering quitting your current job or business?
0. I am not considering quitting at all.
1. I am considering quitting in the near future.
2. I am considering quitting now.

Table 2 Descriptive statistics

Variables	Mean	Std.Dev.	Min.	Max.	Skewness	Kurtosis
wage (not logarithm)	6.2486	3.4996	1	18	0.38	2.86
SEXX	0.5581	0.4969	0	1	-0.23	1.05
SPOUSE	0.7376	0.4402	0	1	-1.08	2.16
COMPEDU	0.3947	0.7870	0	4	1.96	5.96
ST5HLTH	2.5109	1.0268	0	4	-0.28	2.55
SCALE1	0.6444	0.4790	0	1	-0.60	1.36
SCALE2	0.1841	0.3878	0	1	1.63	3.65
XXLSTS	12.9068	2.3956	6	18	-0.09	2.71
JOBEXP	28.0690	15.1646	0	73	0.17	2.33
JOBEXP2	1017.5720	927.9587	0	5329	1.21	4.53
XJOBYR	14.6456	13.6145	0	60	1.03	3.35
XJOBYR2	399.6352	626.4402	0	3600	2.37	9.33
SMFIRM	0.6651	0.4722	0	1	-0.70	1.49
UNION	0.3176	0.4658	0	1	0.78	1.61
NETWORK	0.4695	0.7424	0	5	1.87	7.45
TRUST	1.1323	0.5837	0	2	-0.03	2.80
NORM	0.6778	0.4676	0	1	-0.76	1.58
DEP	0.5972	0.6119	0	2	0.50	2.36

column of Table 3. Our theory that women with husbands may actually be combining work with housework and care of infants seems plausible. Probably, many of these women work part-time, where the work time is shorter and hours are irregular. Regarding the increase in annual salary with an additional year of education, men witnessed an about 4.2% increase and women 5%, which is not substantially different between the two. The number of years of education differed by four years between high school and university graduates, and the annual salary was, therefore, about 16.8% higher for male university graduates and about 20% higher for female university graduates.

However, our estimated results also show that, if women change their jobs at some point of time, they cannot expect the same annual salary increase as men, no matter how much work experience they have. Comparing the wage increase for each year of work experience, we note a difference of about 4.7 times [$=(0.0322-0.0005\times2)/(0.007-0.0002\times2)$] between men and women. You could say that women and men are not on an equal footing when it comes to personnel evaluation, unlike age-based pay. However, there is no noticeable difference whether a woman works in a small and medium-sized or large firm. Traditionally, a man could expect more pay at a large firm compared to a small and medium-sized company. Moreover, being a union member seems to have no impact on the annual salary of women.

These results, when compared with those of other developed nations, may be related to the fact that the number of women being assigned to important posts is still relatively small. Considering the years of education and their influence, we observe that the labor environment for women in our country is improving. However, compared to other developed nations, there is still plenty of room for improvement.

Table 3　Results from Estimation of Mincerian wage regression function-categorical (grouped) data model

Whole sample			Male only			Female only		
Independent variable	coefficinet	standard error	Independent variable	coefficinet	standard error	Independent variable	coefficinet	standard error
Constant	3.5619 ***	(0.2229)	*Constant*	3.8593 ***	(0.1453)	*Constant*	3.8083 ***	(0.1878)
SEXX	0.7781 ***	(0.0493)						
SPOUSE	-0.1160 *	(0.0656)	*SPOUSE*	0.1295 **	(0.0507)	*SPOUSE*	-0.1544 ***	(0.0442)
COMPEDU#	0.0192	(0.0348)	*COMPEDU*	0.0208	(0.0244)	*COMPEDU*	-0.0190	(0.0265)
ST5HLTH#	0.0088	(0.0231)	*ST5HLTH*	-0.0277 *	(0.0160)	*ST5HLTH*	0.0176	(0.0176)
SCALE1	-0.1879 ***	(0.0632)	*SCALE1*	-0.0779 *	(0.0466)	*SCALE1*	-0.1088 **	(0.0443)
SCALE2	-0.1544 **	(0.0784)	*SCALE2*	-0.1110 *	(0.0571)	*SCALE2*	-0.0570	(0.0558)
XXLSTS	0.0760 ***	(0.0121)	*XXLSTS*	0.0419 ***	(0.0078)	*XXLSTS*	0.0495 ***	(0.0110)
JOBEXP	0.0305 ***	(0.0069)	*JOBEXP*	0.0322 ***	(0.0051)	*JOBEXP*@	0.0070	(0.0051)
JOBEXP2	-0.0006 ***	(0.0001)	*JOBEXP2*	-0.0005 ***	(0.0001)	*JOBEXP2*@	-0.0002 *	(0.0001)
XJOBYR	0.0489 ***	(0.0061)	*XJOBYR*	0.0156 ***	(0.0044)	*XJOBYR*	0.0223 ***	(0.0046)
XJOBYR2	-0.0006 ***	(0.0001)	*XJOBYR2*	-0.0002	(0.0001)	*XJOBYR2*	-0.0003 **	(0.0001)
SMFIRM	-0.1296 **	(0.0626)	*SMFIRM*	-0.0611	(0.0445)	*SMFIRM*	-0.0390	(0.0461)
UNION	0.1031	(0.0632)	*UNION*	0.0992 **	(0.0457)	*UNION*	0.0635	(0.0453)
NETWORK	0.0766 **	(0.0327)	*NETWORK*	0.0495 **	(0.0219)	*NETWORK*	0.0436 *	(0.0262)
TRUST	0.1005 **	(0.0408)	*TRUST*	0.0598 **	(0.0284)	*TRUST*	0.0622 **	(0.0310)
NORM	0.0970 *	(0.0517)	*NORM*	0.0758 **	(0.0356)	*NORM*	0.0348	(0.0399)
DEP	-0.0947 **	(0.0397)	*DEP*	-0.0494 *	(0.0287)	*DEP*	-0.0357	(0.0288)
σ	0.6650 ***	(0.0176)	σ	0.3435 ***	(0.0121)	σ	0.3089 ***	(0.0134)
N	869		*N*	485		*N*	384	
Log-L	-1962.86		*Log-L*	-808.27		*Log-L*	-550.62	

*** 1% level of significance, ** 5% level of significance, * 10% level of significance

#Though *COMPEDU* and *ST5HLTH* are statisitcally insignificant, the results from LR test (LR statistic = 25.08 shows that we can not reject H_0: *CUMPEDU* = *ST5HLTH* = 0.

@The null hypothesis $H_0: JOBEXP = JOBEXP2 = 0$ was rejected when an LM test was performed（LM statistic = 6.63）.

Next, among the three social capital factors (trust, norms of reciprocity, and networks), norms of reciprocity have no influence on annual salary. We are not sure why norms of reciprocity have no impact while estimating equation (1) for men and women separately. The difficulties associated with the quantification of norms of reciprocity or the limitations of data used might explain this. For trust, the annual salary rose by about 6% for men and 6.2% for women, and therefore, there is no significant difference between men and women. For networks, the increase was about 5% for men and 4.4% for women, and therefore, again there is no significant difference between men and women. In addition, as the dynamic model of social capital and wage shown in Chapter 2 implies the estimated depreciation rate is $-1 \leq \delta < 0$ excluding the female sample case.

Regarding the influence of social capital measured by *TRUST* and *NORM* on annual salary, there was no significant difference between men and women. Interestingly, this was a contrasting feature between social and human capital. Social capital was an important factor for increasing annual salary for both men and women. Based on the level of education, men and women could expect their annual salary to increase in the almost same ratio. It seems that there is no gender issue with respect to social capital and its relationship with earnings.

Based on estimated results from the combined sample of men and women, shown in the left-hand columns of Table 3, Figures 3a–3c illustrate how trust, network, and norms of reciprocity are related to earnings. We used average values of the data variables to calculate the fitted values of earnings. Figure 3a, relating to trust and network, shows how earnings change when you change the accumulated value. For example, if you compare workers who trust (*TRUST* = 2), between *NETWORK* = 0 and *NETWORK* = 5, you will see a significant difference of 1.42 million yen in annual salary. However, the possibility that workers with a high income will have a broad network and high accumulated network value is undeniable. Since we used cross-sectional data in this research, we are unable to clarify the cause and effect relationship between the two. On the other hand, when the network accumulation value is 5, we see a 0.4 million yen difference between workers where *TRUST* = 2 and *TRUST* = 1.

Likewise, if you compare workers who donate time or money (*NORM* = 1) between *NETWORK* = 0 and *NETWORK* = 5, you will see a difference of 1.32 million yen in annual salary (see Figure 3b). On the other hand, when the network accumulation value is 5, we see a 0.31 million yen difference between workers where *NORM* = 1 and *NORM* = 0. Moreover, comparing workers who give time or money between *TRUST* = 0 and *TRUST* = 2, you will see a difference of 0.44 million yen in annual salary. However, when *TRUST* = 2, we see a 0.27 million yen difference between workers where *NORM* = 1 and *NORM* = 0 (see Figure 3c).

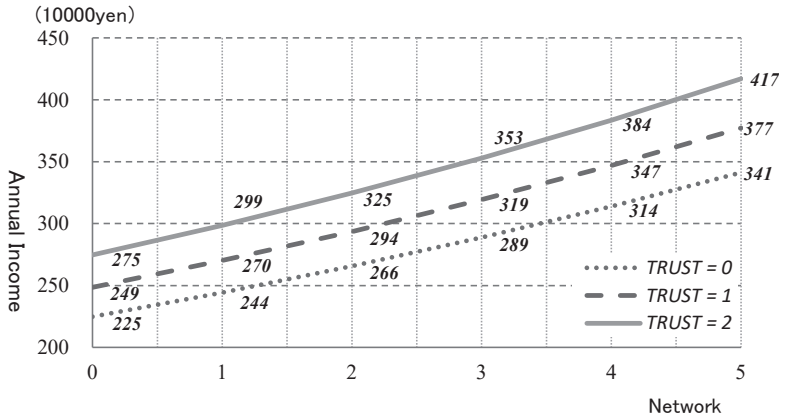

Figure 3a. Annual Wage Incomes vs. Trust & Networks

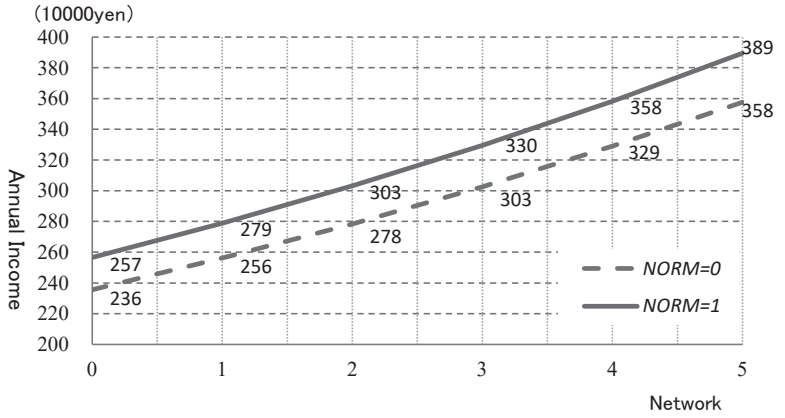

Figure 3b. Annual Wage Incomes vs. Norm & Networks

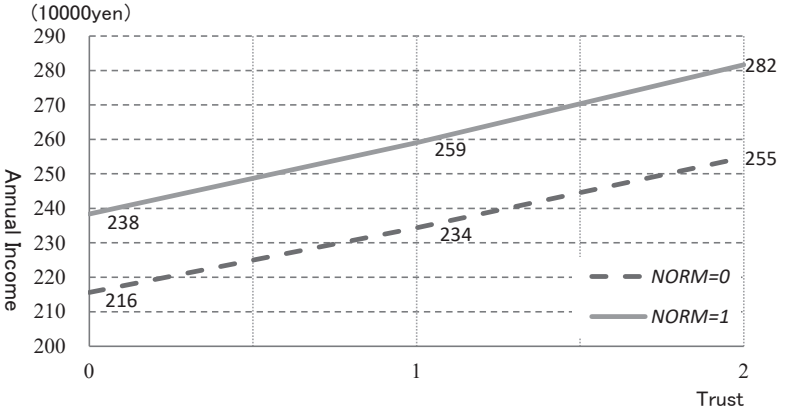

Figure 3c. Annual Wage Incomes vs. Norm & Trust

6. Concluding Remarks

In this paper, we estimated the Mincerian wage regression function after formulating a utility maximization problem that takes into account social capital. There should be many companies where social capital accumulation of workers is reflected in their personnel evaluation because social capital brings useful effects to companies through reducing transactional costs and improving the negotiation skills of workers. However, most Mincerian wage regression function estimations conducted in previous studies focused on factors such as race, gender, and human capital. Therefore, this paper created a theoretical model by focusing on the relationship between social capital and wage. The theoretical model of social capital in this paper showed that the price of social capital is high, and is reflected in wages in an economy with scarce social capital. The econometric model estimation, which validates the results of this theoretical model, indicated that the wage increases, regardless of gender, once the worker's social capital is developed. This is probably because workers with a larger social capital are more likely to be promoted and receive an increased pay because of their better communication skills and higher productivity.

On the other hand, the analysis conducted in this paper indicated that human capital measured by work experiance has a greater wage effect for men than women. The fact that men earn higher wages than women in Japan has been recognized as a gender issue. This paper suggests that a gender issue does exist. We need to carefully monitor the effect of Positive Discrimination, a proactive initiative to promote and utilize the capabilities of women, launched under the Equal Employment Opportunity Law amendments of 2007, enacted to eliminate the de facto gender disparity in the workplace. Meanwhile, this paper's analysis indicates that social capital effect on wages is about the same between men and women. This is a major difference between social capital and human capital.

Now, we need to pay most attention to the method of quantifying social capital in interpreting the analysis results of this paper. Although many researchers have worked on the quantification of social capital, they have not reached a consensus. Therefore, a note on the quantification method is not necessarily specific to this paper. In addition, because no previous study has used an empirical method to explore the social capital effect on wages, I believe this paper is sufficiently meaningful as a pilot study.

Future research tasks include demonstrating whether social capital improves the productivity of companies. If social capital improves the productivity of companies by reducing transaction costs and improving negotiation skills of workers, as social capital theory suggests, we can directly observe the effect of social capital in the productivity of workers. In addition, social capital could be expected to have a greater effect on productivity when the industrial goods are more labor-intensive than capital-intensive. An estimation based on a stochastic frontier model would be useful to analyze this type of

relationship between social capital and the productivity of workers.

[Acknowledgement]

The Japanese General Social Surveys (JGSS) are designed and carried out at the Institute of Regional Studies at Osaka University of Commerce in collaboration with the Institute of Social Science at the University of Tokyo under the direction of Ichiro TANIOKA, Michio NITTA, Noriko IWAI, and Tokio YASUDA. The project is financially assisted by Gakujutsu Frontier Grant from the Japanese Ministry of Education, Culture, Sports, Science and Technology for the academic years 1999－2008, and the datasets are compiled and distributed by SSJ Data Archive, Information Center for Social Science Research on Japan, Institute of Social Science, University of Tokyo.

References

Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. University of Chicago Press.

Belliveau, M. A., O'Reilly III, C. A., and Wade, J. B. (1996). Social capital at the top: Effects of social similarity and status on CEO compensation. *The Academy of Management Journal* 39 (6), 1568－1593.

Bowles, S. G. and Gintis, H. (2002). Social capital and community governance. *Economic Journal* 112, F419－F436.

Cabinet Office, Government of Japan (2003). *Social capital-seeking a virtuous circle of human relationships and civic activities*. National Printing Bureau.

Dearmon, J. and Grier, K. (2009). Trust and development, *Journal of Economic Behavior and Organization* 71, 210－220.

Dincer, O. C. and Uslaner, E. M. (2010). Trust and growth, *Public Choice* 142, 59－67.

Fischer, H. M. and Pollock, T. G. (2004). Effects of social capital and power on surviving transformational change: The case of initial public offerings. *The Academy of Management Journal* 47 (4), 463－481.

Florin, J., Lubatkin, M., and Schulz, W. (2003). A social capital model of high-growth ventures. *The Academy of Management Journal* 46(3), 374－384.

Glaeser, E., Laibson, D., and Sacerdote, B., (2002). An economic approach to social capital, *The Economic Journal* 112 437－458.

Grootaert, C. N. (2004). *Measuring social capital*. The World Bank.

Knack, S. K. and Keefer, P. (1997). Does social capital have an economic payoff? A cross-country investigation. *Quarterly Journal of Economics* 112, 1251－1288.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., and Vishny, R. W. (1997). Trust in large organizations. *American Economic Review Papers and Proceedings* 87, 333－338.

Matsunaga, Y. (2015). Salary commensurate with social capital, *Applied Economics Letters* 22 (14), 1116–1121.

Matsunaga, Y. (2020). NPO sector research and economics, *The Nonprofit Review* 20 (1), 11–23.

Mincer, J. (1974). Schooling, experience, and earnings. NBER.

Nakaba, H. (1995). *Labor Economics*. Shinsei-Sha.

Nomura Research Institute (2008). *Basic knowledge of management jargon* [3rd ed.] Diamond.

Putnam, R. (2000). *Bowling alone*. Siom & Schuster Paperbacks.

Sasajima (2004). *Handbook of wage determination*. Nikkei Publishing.

Mori Building Co. Ltd. (website). *Office life survey*, https://www.mori.co.jp/img/article/090427.pdf (accessed July 30, 2020).

Seibert, S. E., Kraimer, M. L., and Liden, R. C. (2001). *The Academy of Management Journal* 44 (2), 219–237.

Sobel, J. (2002). Can we trust social capital? *Journal of Economic Literature* 40, 139–154.

Zak, P. K. and Knack, S. K. (2001). Trust and growth. *Economic Journal* 111, 295–321.